SRF

Memorandum

SRF No. 12721

To: Brian Hansen
Development Coordinator
City of Bloomington

From: Brent Clark, PE, Senior Engineer
Josh Maus, PE, Principal

Date: June 10, 2020

Subject: SICK Inc. Development Traffic Study

Introduction

SRF has completed a traffic study for the proposed SICK Inc. Development in the City of Bloomington. The development is generally bounded by American Boulevard to the north, 28th Avenue to the east, Lindau Lane to the south, and 24th Avenue to the west (Figure 1: Project Location). The initial phase of development is expected to open in year 2022, with future development phases expected to occur on site. While the study accounts for the future phases, these phases are not being considered as part of the current development submittal. Therefore, the main objectives of this study are to evaluate the existing operations within the study area and identify any potential deficiencies in safety, capacity, or operations on the adjacent roadway network associated with the proposed development. The following information provides the assumptions, analysis, and study recommendations offered for consideration.

Previous Area Studies

Development and transportation within the project area has been discussed and evaluated over the past few years. The following studies have been conducted since 2018 that have reviewed various intersections and/or roadway segments within the study area.

1) *South Loop Roadway Infrastructure Improvement Study,* SRF Consulting (March 2018)
2) *Mall of America Phase 2B Waterpark Development Traffic Study*, SRF Consulting (March 2020)

The "*South Loop Roadway Infrastructure Improvement Study"* was developed by SRF Consulting Group, Inc. (SRF) in March 2018 (hereon referred to as the *South Loop Study*) and was an update to the previous AUAR for the South Loop District. The "*Mall of America Phase 2B Waterpark Development Traffic Study"* was developed by SRF in March 2020 (hereon referred to as the *Waterpark Study*) to account for development proposals at the Mall of America (MOA). As part of the *Waterpark Study*, traffic counts and land use projections from the *South Loop Study* were updated throughout the South Loop District and operations were evaluated under existing, 2025, and 2040 conditions within the study area. However, since completion of the *Waterpark Study*, land use and access assumptions have been refined for the SICK Inc. development area. Therefore, information from each of these studies were leveraged to aide in the development of the *SICK Inc. Development Traffic Study.*

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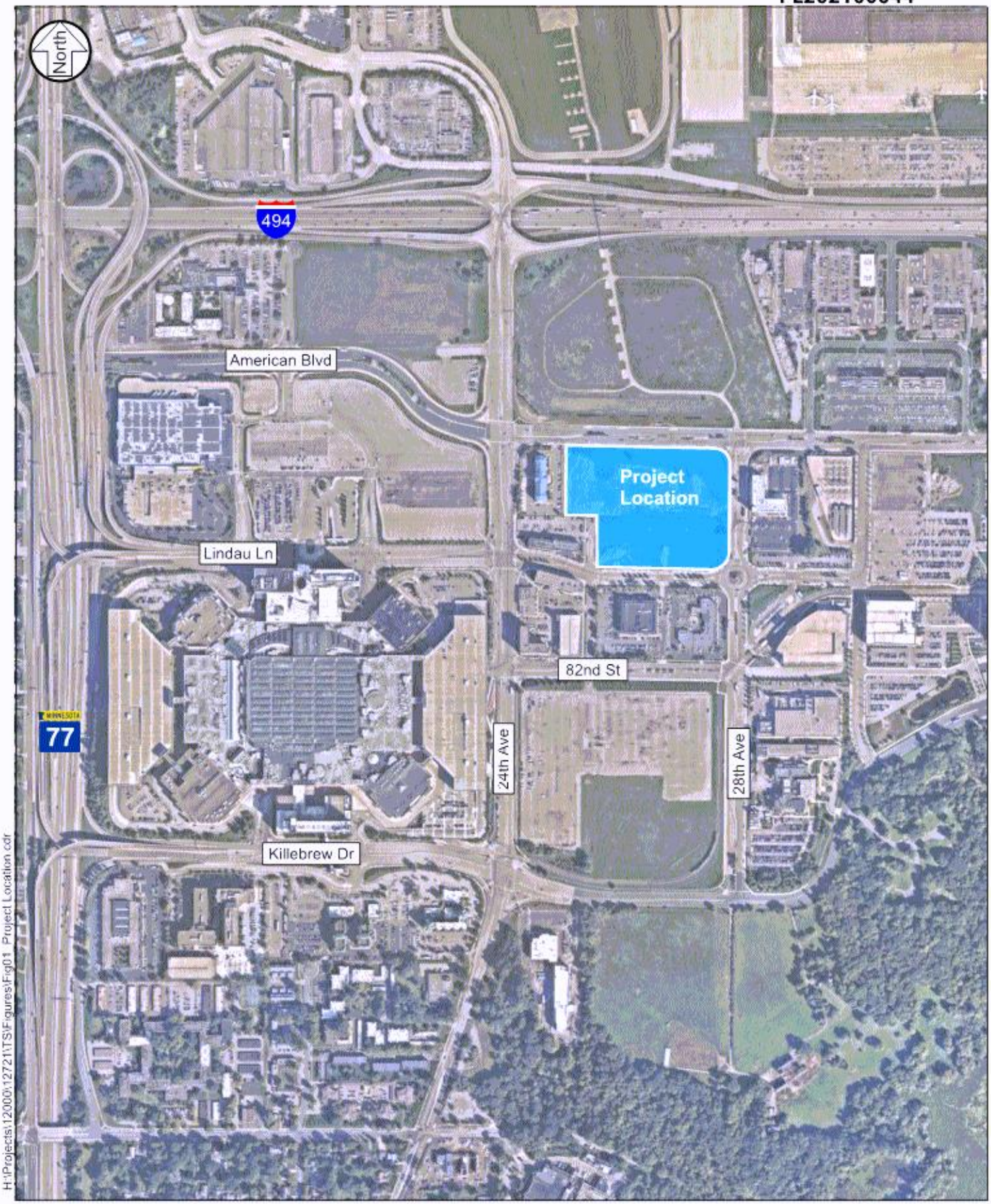

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Project Location

SICK, Inc. Development Traffic Study

City of Bloomington

Figure 1

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Existing Conditions

Existing conditions were reviewed to establish a baseline condition to compare build conditions with and determine any impacts of the proposed development. The evaluation of existing conditions includes traffic data, roadway characteristics, and an intersection capacity analysis, which are summarized in the following sections.

Traffic Data

The *Waterpark Study* utilized a combination of newly collected data and historical traffic data in the study area. However, as part of the study, turning movements were never captured at the proposed SICK Inc. access location along Lindau Lane. Due to abnormal travel patterns caused by the COVID-19 pandemic, previously collected (week of November 18th, 2019) video data at the adjacent Lindau Lane/24th Avenue intersection was utilized to capture turning movement counts at the Lindau Lane/26th Avenue intersection. This video data was not set at the ideal distance for capturing turning movement counts at the Lindau Lane/26th Avenue intersection, therefore, the turning movement counts were developed based on a combination of video observations, land use information, and engineering judgement.

Roadway Characteristics

A field assessment was completed to identify various roadway characteristics within the study area, such as functional classification, general configuration, and posted speed limit. A summary of these roadway characteristics is shown in Table 1. Note that these are general characteristics and that there are some deviations within the area or segments of the roadways. For example, Lindau Lane transitions from a 6-lane divided major collector to a 2-lane divided local road east of 24th Avenue; 24th Avenue transitions from an 8-lane divided A-minor reliever to a 6-lane divided A-minor expander south of American Boulevard.

Table 1. Existing Roadway Characteristics

Roadway	Functional Classification	Configuration	Posted Speed Limit (mph)
24th Avenue	A Minor Expander	8-lane divided/6-lane divided	40
28th Avenue	Major Collector	4-lane divided	35
American Boulevard	A Minor Reliever	4-lane divided	35
Lindau Lane	Local Road	6-lane divided/2-lane divided	30

From a traffic control perspective, the Lindau Lane/24th Avenue intersection is signalized, and the Lindau Lane/26th Avenue intersection is side-street stop controlled. Existing geometrics, traffic controls, and traffic volumes at the study intersections are shown in Figure 2.

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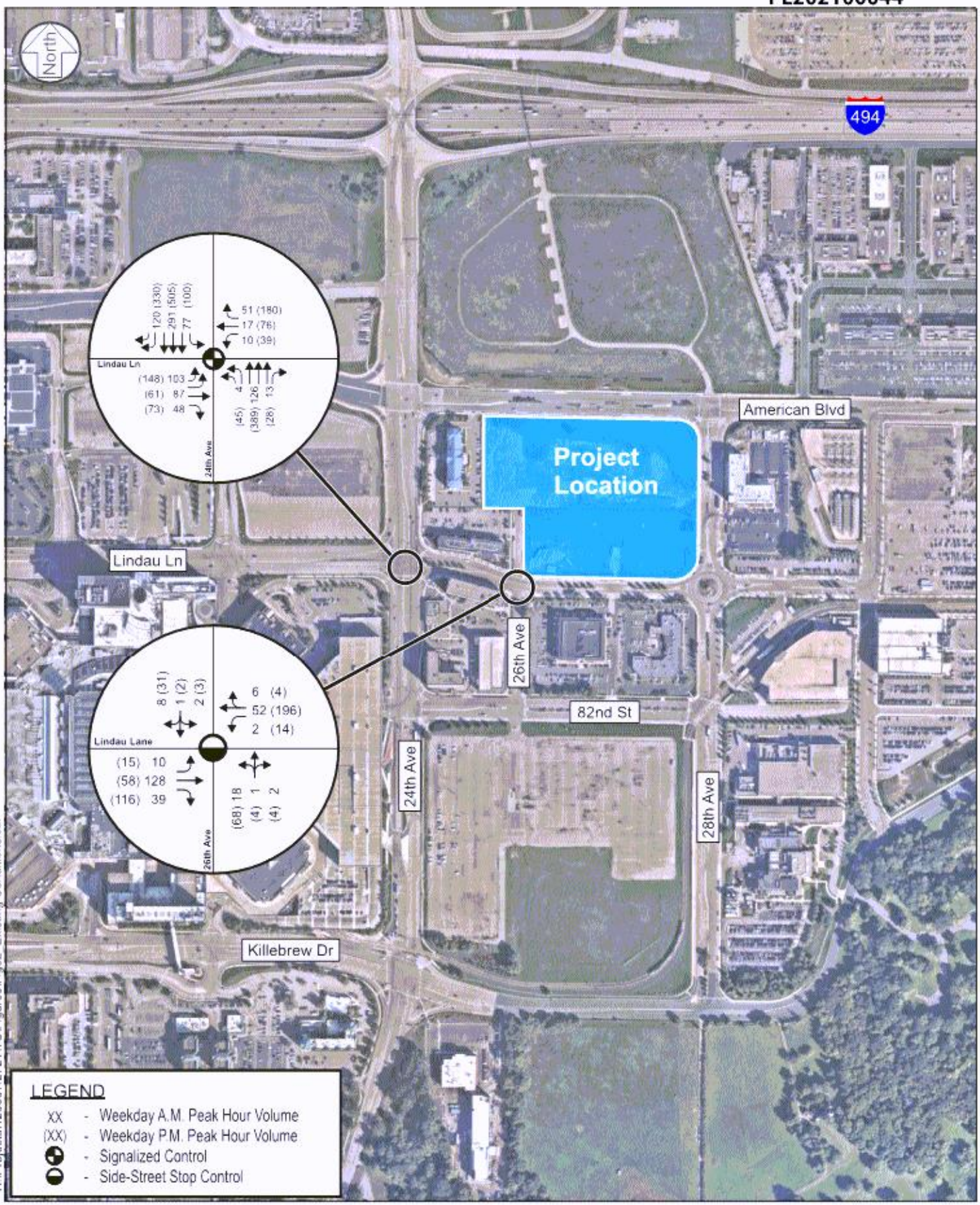

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Existing Conditions

SICK, Inc. Development Traffic Study
City of Bloomington

Figure 2

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Intersection Operations Analysis

An intersection capacity analysis was conducted to determine how traffic is currently operating at the study intersections during typical weekday a.m. and p.m. peak hour conditions. All study intersections were analyzed using Synchro/SimTraffic (V11.0) software. Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are ranked from LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 2 LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. Overall intersection LOS A through LOS D is considered acceptable by the City of Bloomington.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 – 20	> 10 - 15
C	> 20 – 35	> 15 - 25
D	> 35 – 55	> 25 - 35
E	> 55 – 80	> 35 - 50
F	> 80	> 50

For side-street stop-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes.

Second, it is important to consider the delay on the minor approach. Since the mainline is not stop controlled, the majority of delay is attributed to the minor approaches. It is typical of unsignalized intersections with higher mainline traffic volumes to experience high levels of delay, i.e. poor levels of service, on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing capacity analysis shown in Table 3 indicate that all study intersections currently operate at an acceptable overall LOS C or better during the weekday a.m. and p.m. peak hours, with the existing traffic control, geometric layout, and signal timing. Detailed traffic operations results, including movement delays and queue lengths are provided in the Appendix.

Table 3. Existing Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Lindau Lane/24th Avenue	A	11 sec.	C	21 sec.
Lindau Lane/26th Avenue (1)	A/A	5 sec.	A/A	7 sec.

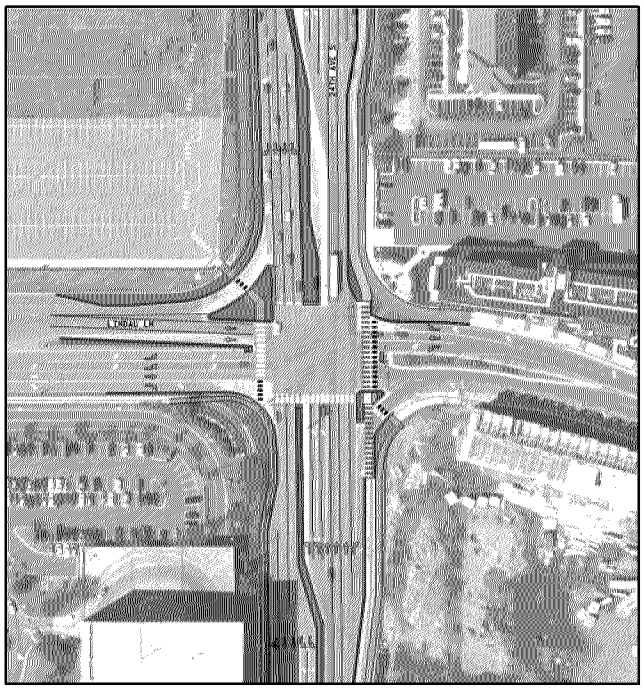
(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

The following information summarizes the operational and/or queuing issues identified as part of the existing capacity analysis:

- **Lindau Lane/24th Avenue**: The westbound left-turn lane storage (approximately 100 feet) is blocked by the westbound thru queues approximately five (5) percent of the p.m. peak hour.

Planned Transportation Improvements

The City of Bloomington has funding allocated to several improvements in the South Loop District as part of their *2018-2027 Capital Improvement Plan*. One improvement that pertains to the immediate study area is the 24th Avenue Corridor Reconstruction Project from I-494 to East Old Shakopee Road. The project includes the removal of channelized right-turns on the eastbound/westbound approaches, one of the southbound channelized right-turns, and a southbound thru at the 24th Avenue and Lindau Lane intersection as shown in the inset. In addition to the removals, the southbound left-turn lane storage is expected to be extended approximately 150 feet. These improvements are intended to improve pedestrian and bicycle safety, while removing infrastructure that is not needed from a capacity perspective. Since the intersection geometry is being modified, signal timing modifications are also assumed as part of the project. The reconstruction project is expected sometime between 2025 and 2028, therefore, for the purpose of this study, the improvement was assumed in the year 2025 and 2040 operations analysis, but not year 2022 analysis. In addition to the 24th Avenue Corridor Reconstruction Project, other various improvement projects identified in the *South Loop Study* are captured in the future operation models and traffic volumes.



Proposed Development

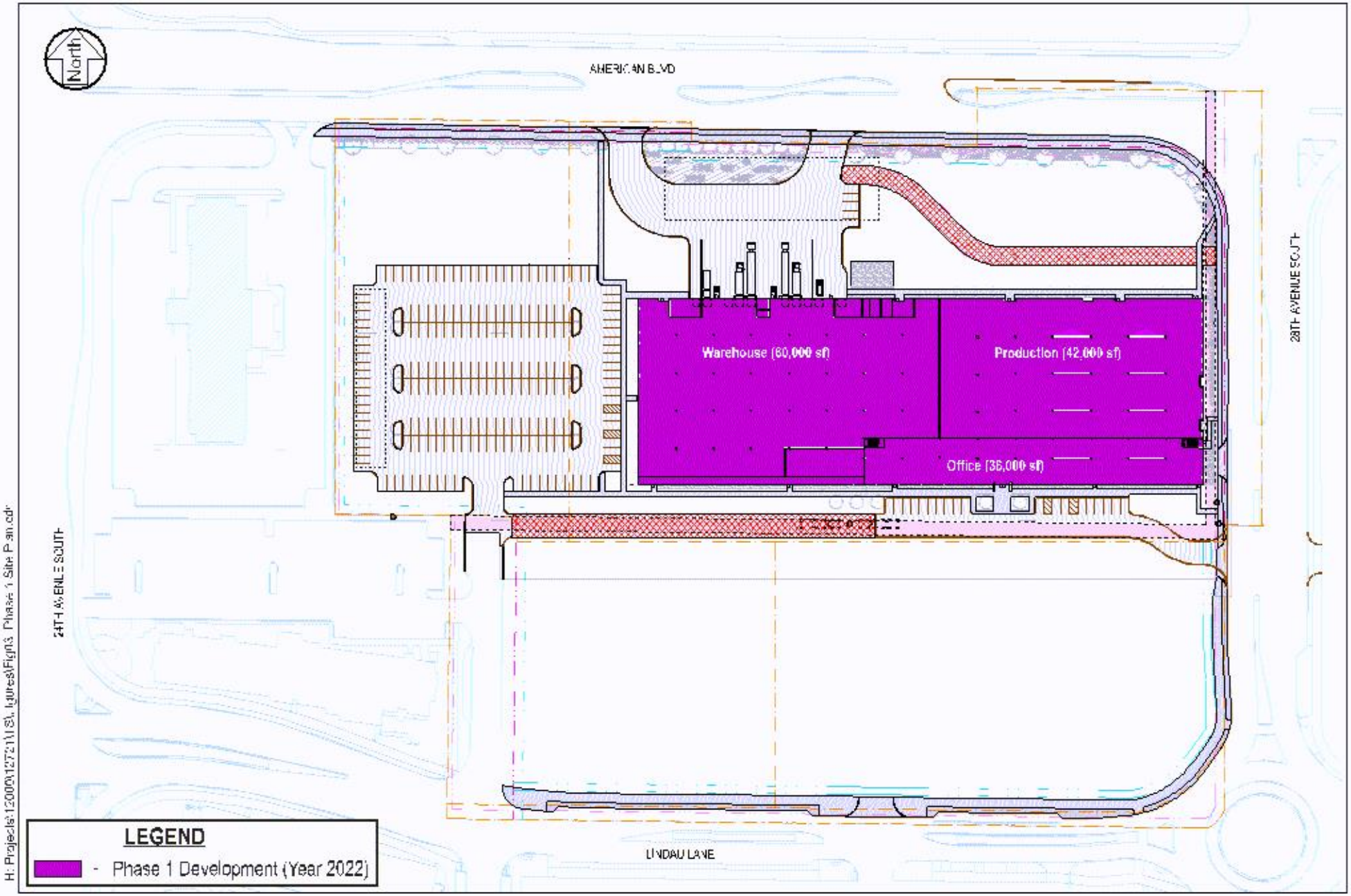
The SICK Inc. development area is generally bounded by American Boulevard to the north, 28th Avenue to the east, Lindau Lane to the south, and 24th Avenue to the west. The project area has been vacant since 2017. The 493,000-sf development is expected to be constructed in four phases over the next 15 years, depending on market conditions. SICK Inc., a global manufacturer of sensor solutions for industrial applications, currently has offices in Savage and Bloomington and plans to relocate these offices to the proposed development as phases are completed. The initial phase (Phase 1) is expected to be constructed by 2022, with the subsequent phases to follow. The current proposed development site plan for Phase 1 is shown in Figure 3. A summary of the proposed land uses and the estimated timeline of construction for all phases of the development are shown in Figure 4 and Table 4.

Table 4. SICK Inc. Proposed Development by Phase

Type of Use	Phase 1 (2022)	Phase 2 (2025)	Phase 3 (2030)	Phase 4 (2035)	Total
Office	36,000 sf	144,000 sf	-	108,000 sf	288,000 sf
Warehouse	60,000 sf	-	-	60,000 sf	120,000 sf
Production	42,000 sf	-	43,000 sf	-	85,000 sf

The proposed development plans to provide access to the site at four locations. A full access is proposed along American Boulevard, with a right-in right-out access proposed approximately 225 feet east of the full access. The access points along American Boulevard are designated for heavy truck and delivery traffic. It is anticipated that approximately 20 pick-up/deliveries will occur throughout the day. A full access is also proposed along 28th Street, adjacent from the new Cambria Hotel Bloomington Mall of America access. This access is designated for guest parking under Phase 1, and garbage/small deliveries under Phases 2-4.

The primary access will be located at the existing Lindau Lane/26th Avenue intersection and will provide access for employees for all phases of development. The initial phase of development will provide an approximately 240-stall surface parking lot west of the proposed building. Under Phase 2, a 550-stall parking ramp is proposed south of the surface parking lot, which will be utilized to accommodate the increased office development. Phase 4 of development proposes to provide a 590-stall parking ramp expansion and reconstruct the 240-stall surface parking lot into additional warehouse space. The proposed parking ramp is designated for SICK employees-only during business hours, and open to the general public on weeknights and weekends.



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Phase 1 Site Plan

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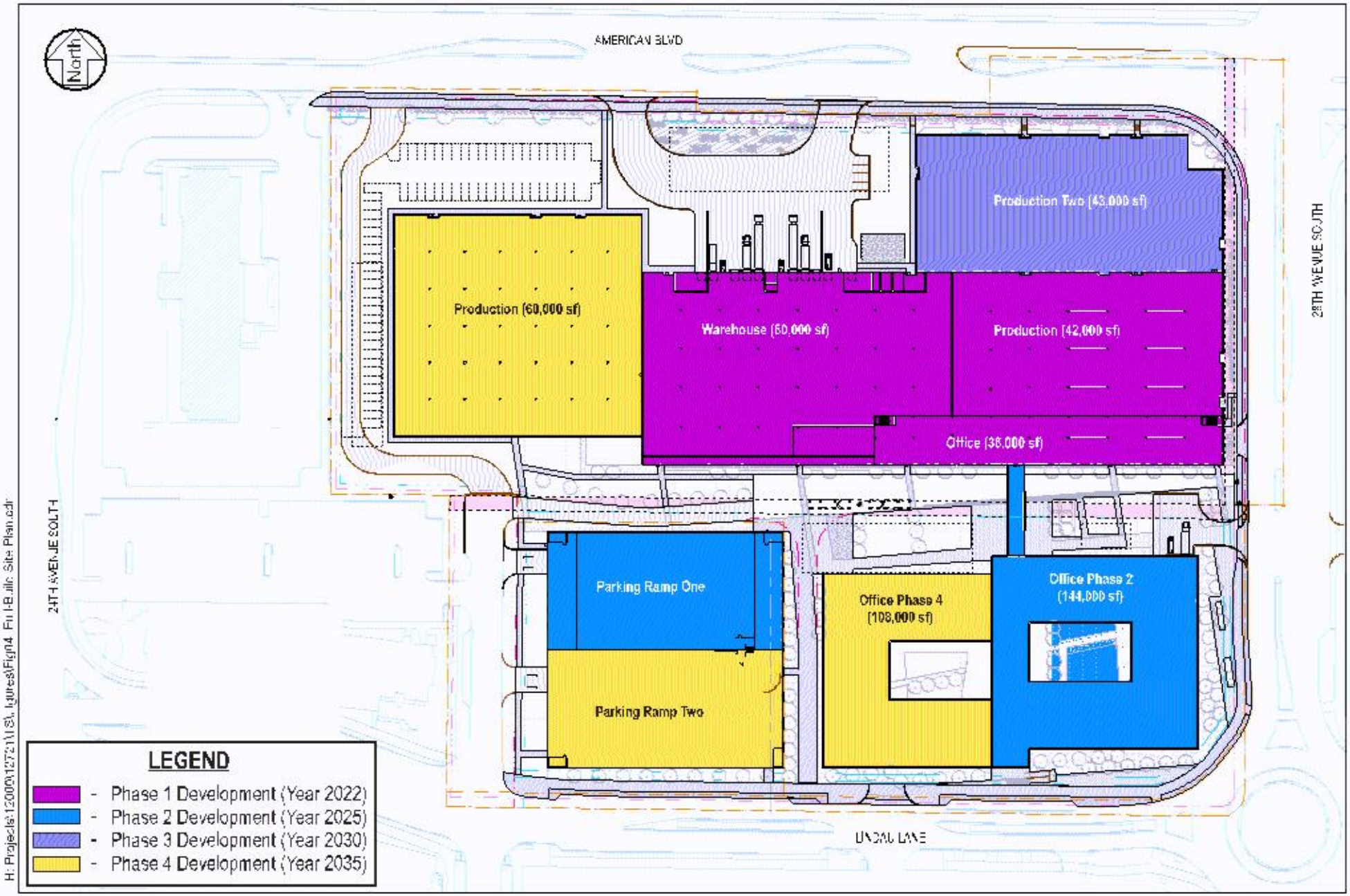
Figure 3



Full-Build Site Plan

SICK, Inc. Development Traffic Study
City of Bloomington

Figure 4

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Traffic Forecasts

Traffic forecasts were developed to understand how the transportation system study area would be expected to operate with the proposed SICK Inc. development. The forecasts account for planned infrastructure improvements, South Loop District background traffic, and traffic generated by the proposed SICK Inc. development. The following sections outline the proposed development trip generation within the study area, as well as the overall traffic forecast development process and assumptions.

Background Traffic

As mentioned previously, short- and long-term traffic forecasts were developed for the South Loop District area as part of the *South Loop Study* and were updated as part of the *Waterpark Study*. These forecasts were developed using a combination of the updated MOA development trip generation along with the South Loop District background traffic. The South Loop District background traffic accounts for the adjacent land use development in the area, background growth, and travel pattern shifts due to the future construction projects, such as the 77th Street Connection. Therefore, to be consistent with previous area studies, the forecasts developed as part of the *Waterpark Study* were utilized as part of this study. These forecasts were then updated to account for changes to the SICK Inc. development area.

Development Traffic

To account for traffic impacts associated with the proposed development, trip generation estimates for the proposed land uses were developed for the a.m. and p.m. peak hours and a daily basis. These estimates, shown in Table 5, were developed using the *ITE Trip Generation Manual, 10th Edition*. The specific ITE land use codes used, as well as the assumed project phasing, were developed in conjunction with project staff during the study process. It should be noted that SICK Inc. is not anticipated to be open on weekends, therefore no Saturday peak hour trips were assumed. Due to the close proximity to the 28th Station light rail, a five (5) percent light rail reduction was applied to the trip generation estimates, which is consistent with previous area studies.

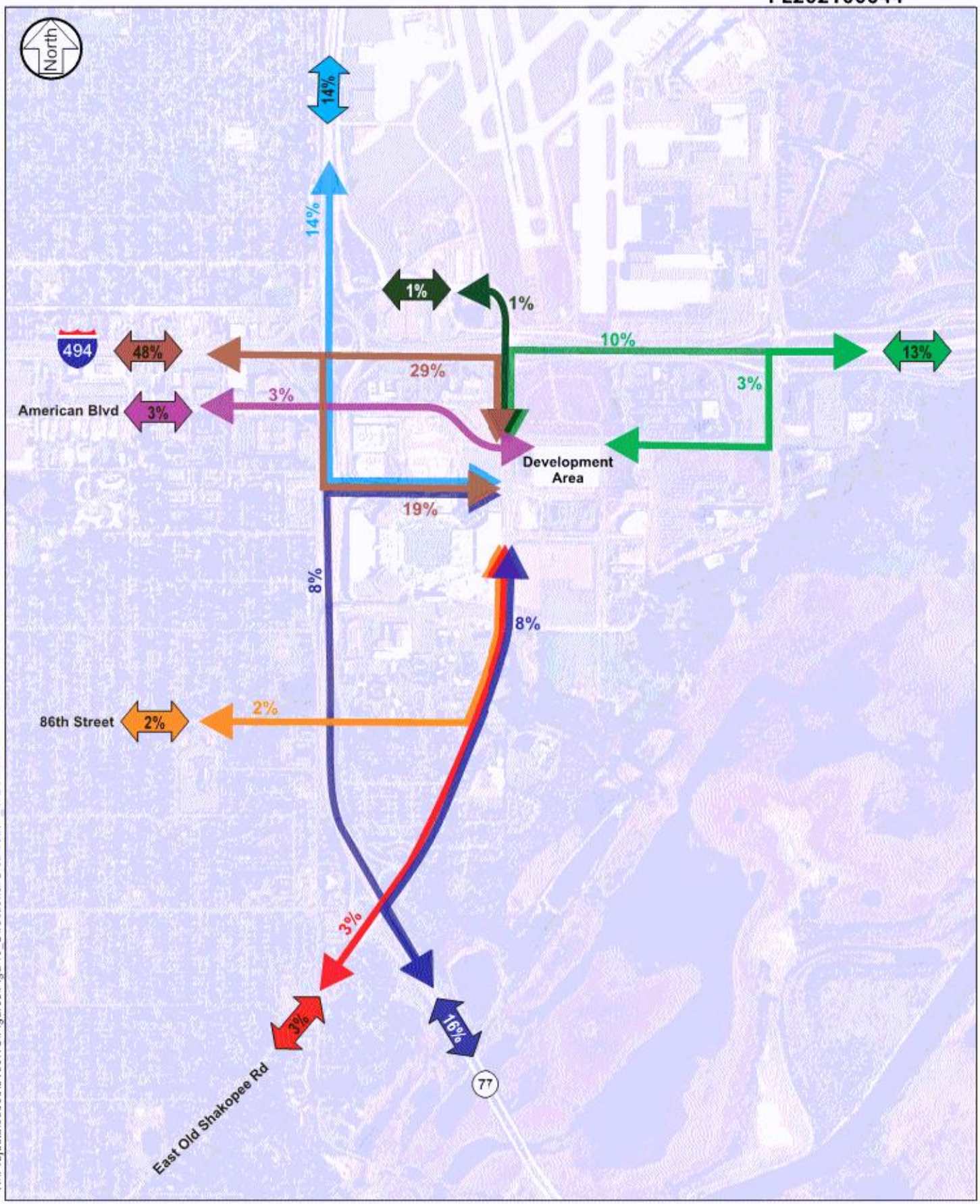
Accounting for the light-rail reduction, the proposed development is expected to generate approximately 387 a.m. peak hour, 391 p.m. peak hour, and 3,181 daily trips once fully constructed. The amount of proposed office space has a large impact on the amount of vehicular trips to/from the site. Phase 3, for example, has no proposed office space and is expected to have a minimal amount of new trips. Therefore, for analysis purposes, the year of opening (2022), year 2025, and year 2040 conditions were analyzed. The year of opening represents the current development proposal. The Year 2025 and 2040 conditions align with previous area study forecasts/analysis and fall in line with the proposed increases in office development/trip generation.

Table 5. Proposed Development Trip Generation Estimate

Phase (Estimated Construction Year) Land Use Type *(ITE Code)*	Size	A.M. Peak Hour Trips		P.M. Peak Hour Trips		Weekday Daily Trips
		In	Out	In	Out	
Phase 1 Development (2022)						
Office *(710)*	36,000 sf	36	6	7	35	351
Warehouse *(150)*	60,000 sf	8	2	3	8	104
Production *(140)*	42,000 sf	20	6	9	19	165
Phase 1 Subtotal		64	14	18	63	620
Light Rail Reduction (5%) (1)		*(-3)*	*(-1)*	*(-1)*	*(-3)*	*(-31)*
Phase 1 Total		61	13	18	59	589
Phase 2 Development (2025)						
Office *(710)*	144,000 sf	144	23	26	139	1,403
Light Rail Reduction (5%) (1)		*(-7)*	*(-1)*	*(-1)*	*(-7)*	*(-70)*
Phase 2 Total		136	22	25	132	1,332
Phase 3 Development (2030)						
Production *(140)*	43,000 sf	21	6	9	20	169
Light Rail Reduction (5%) (1)		*(-1)*	*(0)*	*(0)*	*(-1)*	*(-8)*
Phase 3 Total		20	6	9	19	161
Phase 4 Development (2035)						
Office *(710)*	108,000 sf	108	18	20	104	1,052
Warehouse *(150)*	60,000 sf	8	2	3	8	104
Phase 4 Subtotal		116	20	23	113	1,156
Light Rail Reduction (5%) (1)		*(-6)*	*(-1)*	*(-1)*	*(-6)*	*(-58)*
Phase 4 Total		110	19	22	107	1,099
Year 2023 Total Trips (Phase 1)		61	13	18	59	589
Year 2025 Total Trips (Phase 1 & 2)		197	35	43	191	1,921
Year 2040 Total Trips (All Phases)		327	60	74	317	3,181

(1) A light rail reduction of five (5) percent was applied to the ITE Trip Generation estimates to account for a light rail station with ¼ mile of Development.

New trips generated by the proposed development were distributed throughout the study area based on the directional distribution shown in Figure 5. The directional distribution was developed based on the current SICK Inc. (Savage and Bloomington offices) employee's home locations (by City) provided by SICK Inc. This distribution was utilized for all evaluation years. While the distribution may change, especially by year 2040 as the new site becomes established, the change in distribution is not expected to be significant enough to change the analysis results. The resultant year 2022, 2025, and 2040 peak hour traffic forecasts, which include general background growth, adjacent development, future construction projects, and traffic generated by the proposed development, are shown in Figures 6, 7, and 8, respectively.



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Directional Distribution

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City of Bloomington

Figure 5

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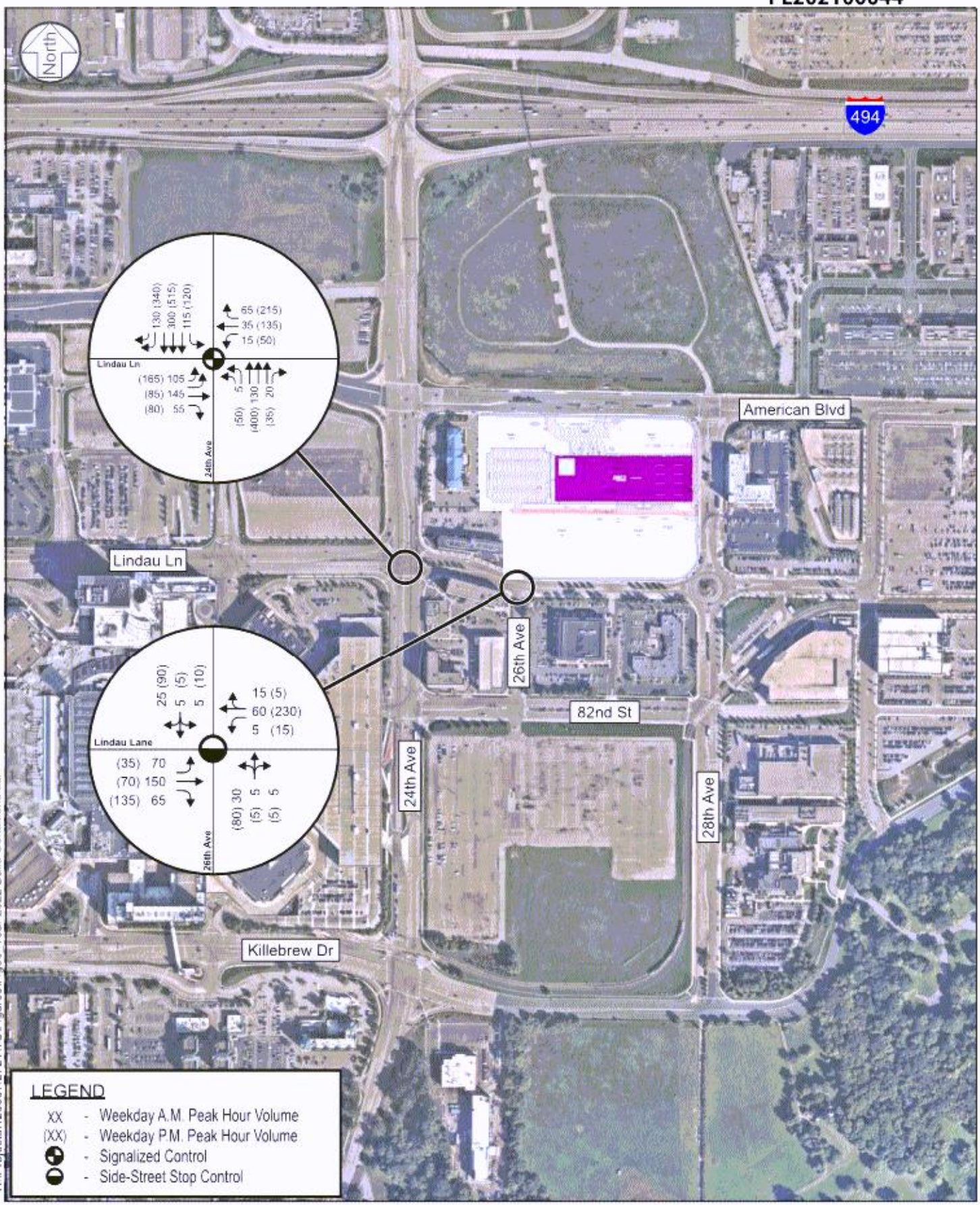

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Year 2022 Build Conditions

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Figure 6

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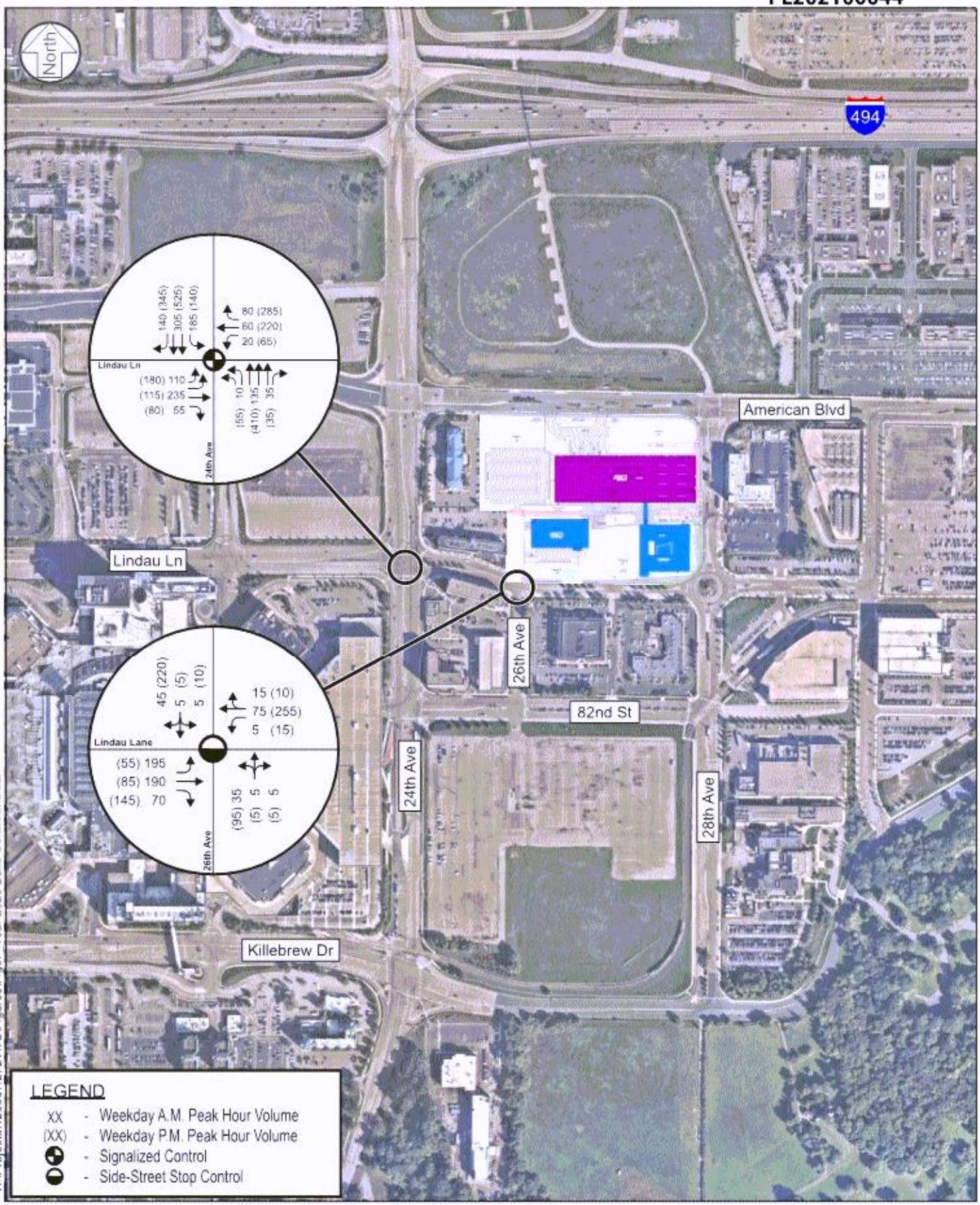

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Year 2025 Build Conditions

SICK, Inc. Development Traffic Study
City of Bloomington

Figure 7

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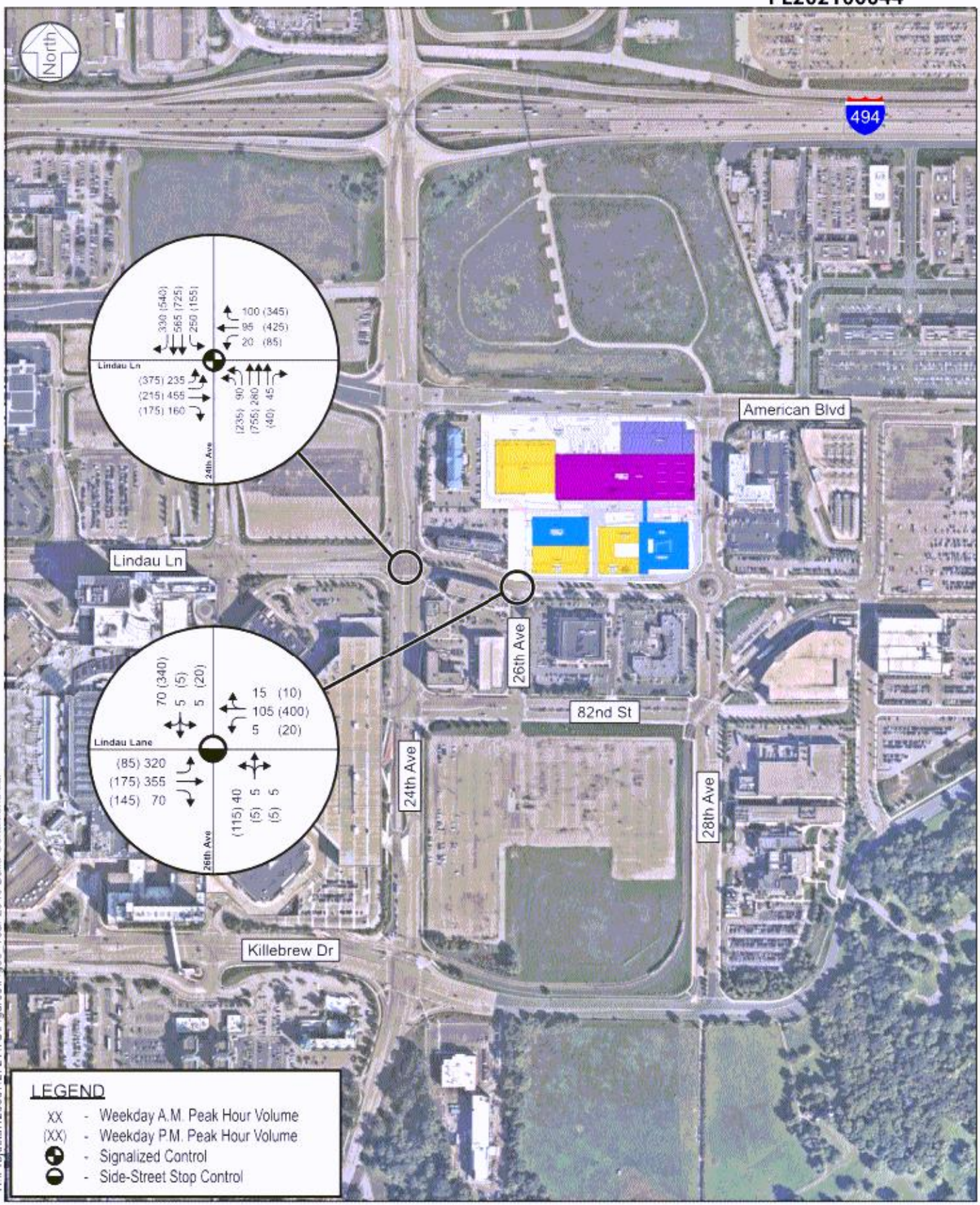

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Year 2040 Build Conditions

SICK, Inc. Development Traffic Study
City of Bloomington

Figure 8

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Trip Generation Comparison

The trip generation estimates for the future SICK Inc. development phases were compared to the *South Loop Study/Waterpark Study* trip generation estimates for year 2025 and 2040 and are shown in Table 6 and 7, respectively. The comparison indicates that the SICK development will generate approximately 64 fewer a.m. peak hour trips and 48 fewer p.m. peak hour trips than previous year 2025 development assumptions, and 206 fewer a.m. peak hour trips and 174 fewer p.m. peak hour trips than the previous year 2040 development assumptions.

Table 6. Year 2025 Development Trip Generation Comparison

Phase - Land Use Type	Size	Weekday A.M. Peak Hour Trips		Weekday P.M. Peak Hour Trips	
		In	Out	In	Out
***South Loop/Waterpark Study* Development Assumptions**					
Office (710)	200 KSF	260	36	48	234
Current Development Proposal (Phases 1 & 2)					
Office (710)	180 KSF	171	27	32	165
Warehouse (150)	8 KSF	7	2	3	8
Production (140)	20 KSF	19	6	8	18
2025 Net New System Trips		197	35	43	191
Total Change in Trips from *South Loop Study*		(-63)	(-1)	(-5)	(-43)

Table 7. Year 2040 Development Trip Generation Comparison

Phase - Land Use Type	Size	Weekday A.M. Peak Hour Trips		Weekday P.M. Peak Hour Trips	
		In	Out	In	Out
***South Loop/Waterpark Study* Total Development Assumptions**					
Office (710)	400 KSF	520	72	96	468
Current Development Proposal (All Phases)					
Office (710)	288 KSF	273	44	50	264
Warehouse (150)	120 KSF	15	5	6	16
Production (140)	85 KSF	38	11	17	37
Existing to 2040 Net New System Trips		326	60	73	317
Total Change in Trips from *South Loop Study*		(-194)	(-12)	(-23)	(-151)

Although the proposed development is expected to generate fewer trips compared to previous assumptions, vehicular routing and directional distributions have changed. As mentioned previously, the directional distribution is based on the existing SICK Inc. employee's home locations, rather than the general South Loop District distribution, which results in a higher distribution to/from the west than the east. While the access locations are similar to previous assumptions, the expected operations of those access points have changed. The access locations along American Boulevard and 28th Avenue are dedicated to truck/delivery operations only, and are expected to have very minimal, if not zero, peak hour vehicular trips. Therefore, more vehicles are expected to utilize the site using Lindau Lane than previous assumptions.

Future Operations Analysis

To determine how the study intersections will accommodate the year 2022, 2025, and 2040 build traffic forecasts, an intersection capacity analysis was completed using Synchro/SimTraffic software. As previously mentioned, the 24th Avenue Corridor Reconstruction project, along with signal timing modifications, were assumed in the year 2025 and 2040 operations analysis. Results of the analysis, summarized in Table 8, indicate that all study intersections are expected to operate at an overall LOS D or better during the a.m. and p.m. peak hours. Detailed traffic operations results, including movement delays and queue lengths are provided in the Appendix.

Table 8. Intersection Capacity Analysis Summary

Intersection	Existing		Year 2022		Year 2025 (2)		Year 2040 (2)	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
A.M. Peak Hour								
Lindau Lane/24th Avenue	A	11 sec.	A	13 sec.	B	17 sec.	C	25 sec.
Lindau Lane/26th Avenue (1)	A/A	5 sec.	A/A	6 sec.	A/A	9 sec.	A/C	16 sec.
P.M. Peak Hour								
Lindau Lane/24th Avenue	C	21 sec.	C	24 sec.	D	27 sec.	D	41 sec.
Lindau Lane/26th Avenue (1)	A/A	7 sec.	A/A	7 sec.	A/A	9 sec.	A/C	24 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay

(2) The 24th Avenue Corridor Reconstruction project is assumed in the analysis, which includes longer southbound left-turn storage and optimized signal timing. Note that if the reconstruction project is not completed by year 2025, the southbound left-turn queueing is expected to extend beyond storage during the a.m. and p.m. peak hours under 2025 conditions.

The following information summarizes the operational and/or queuing issues that warrant consideration as traffic volumes increase:

- **Lindau Lane/24th Avenue**
    - As traffic volumes increase in the area, the westbound queues at the intersection are expected to increase, resulting in the following impacts:
        - The westbound left-turn lane storage is expected to be blocked during the p.m. peak hour approximately 15 percent in year 2022, 30 percent in year 2025, and 50 percent in year 2040.

        - Under year 2040 conditions, the westbound queues are expected to extend beyond the Lindau Lane/26th Avenue intersection approximately 5-10 percent of the p.m. peak hour, with maximum queues of greater than 500 feet. This is expected to have impacts to the side-street stop approaches at the Lindau Lane/26th Avenue intersection.

- **Lindau Lane/26th Avenue**:
    - The side-street stop approaches at the intersection are expected to be impacted based on a combination of traffic volume increases and westbound queues from the Lindau Lane/24th Avenue intersection. A summary of the expected p.m. peak hour side-street queues under future conditions is shown below:
        - Year 2025:
            - Southbound: Average - 50 ft; 95th percentile - 100 ft
            - Northbound: Average - 35 ft; 95th percentile - 60 ft
        - Year 2040
            - Southbound: Average - 115 ft; 95th percentile - 215 ft
            - Northbound: Average - 50 ft; 95th percentile - 100 ft

Under year 2040 conditions, the 95th percentile queues are expected to extend to the parking ramp's north exit-only during the p.m. peak hour, which may cause queuing into the ramp. This is expected to occur only approximately 5 to 10 percent of the p.m. peak hour, as the average queues are expected to be approximately 115 feet. Therefore, potential improvements to limit the northbound queuing impacts are discussed below:

- A traffic signal was considered at the Lindau Lane/26th Avenue, however, it is not expected to provide any benefits to the southbound queue, as most of the southbound movements are right turns. In addition, a traffic signal is not expected to be warranted by year 2040, and the side-street approaches operate with acceptable levels of service.
- The parking ramp could be shifted north to provide more southbound storage and limit queues extending into the ramp. This improvement could also be utilized to align with other access and would provide sight distance benefits as discussed later in this document.
- "Do Not Block the Intersection" signage could be installed at the westbound approach of Lindau Lane. Signage could help reduce the amount of times vehicles stop in the intersection when westbound queues beyond 26th Avenue, blocking side-street movements from occurring.
- The westbound right-turn lane at the Lindau Lane/24th Avenue intersection could be converted to a westbound thru-right lane. This conversion would negatively impact delay for westbound right-turns but is expected to balance queues better as the westbound thru movement is expected to be the largest westbound movement in year 2040. With the westbound thru-right lane conversion, westbound queues along Lindau Lane are expected to have less impact to the 26th Avenue intersection.

Recommendation: Monitor the intersection and if queueing becomes an issue consider installing "Do Not Block the Intersection" signage for the westbound approach on Lindau Lane and/or converting the westbound right-turn lane to a westbound thru-right lane at the Lindau Lane/24th Avenue intersection.

Access Evaluation

In addition to traffic operations, truck turning movements and intersection sight distance was reviewed to identify any safety or geometric issues with the proposed site access locations. The following information summarizes the assumptions, analysis, and recommendations offered for consideration.

Truck Turning Movements

Given the nature of the development, truck turning movements were reviewed at the American Boulevard access locations to determine if there were any issues with intersection geometrics. The designated truck route into the site is anticipated from I-494 to 24th Avenue, resulting in an eastbound right-turn at the full access at American Boulevard. The designated truck route out of the site is anticipated by utilizing the right-in/right-out access on American Boulevard and accessing I-494 via 34th Avenue. Other access locations were not reviewed, as they are dedicated to employee passenger vehicles or small utility vehicles (i.e. garbage truck, UPS/Fedex deliveries). The turning movement verification, as shown in the Appendix, was completed for a WB-62 design vehicle using AutoTURN software. Results of the truck turning movement analysis indicate that the American Boulevard access locations are capable of accommodating WB-62 vehicular movements. The full-access geometrics, however, are very tight for the eastbound right-turn maneuver, as this maneuver is expected to encroach on curb and gutter. The northbound right-turn out of the site is expected to encroach on the outer eastbound lane of travel on American Boulevard, however, this is common for WB-62 vehicular movements from side-street stop control and is not an issue as truck drivers adjust their gap acceptance to account for these movements. While not the anticipated truck route, westbound left-turns into the site were also reviewed, and the access location is adequate. The westbound left-turn lane storage is limited (approximately 100 feet) and may not be able to store two westbound WB-62's at the same time, however, based on the anticipated truck volumes this is expected to rarely occur.

Recommendation: Expand the full-access slightly to provide more space for the designated eastbound right-turn truck maneuvers. Considerations could be made towards reconfiguring the median along American Boulevard to reallocate space and provide more westbound left-turn storage, due to the undevelopable area to the north, however, this is not necessary from a traffic operations perspective.

Intersection Sight Distance

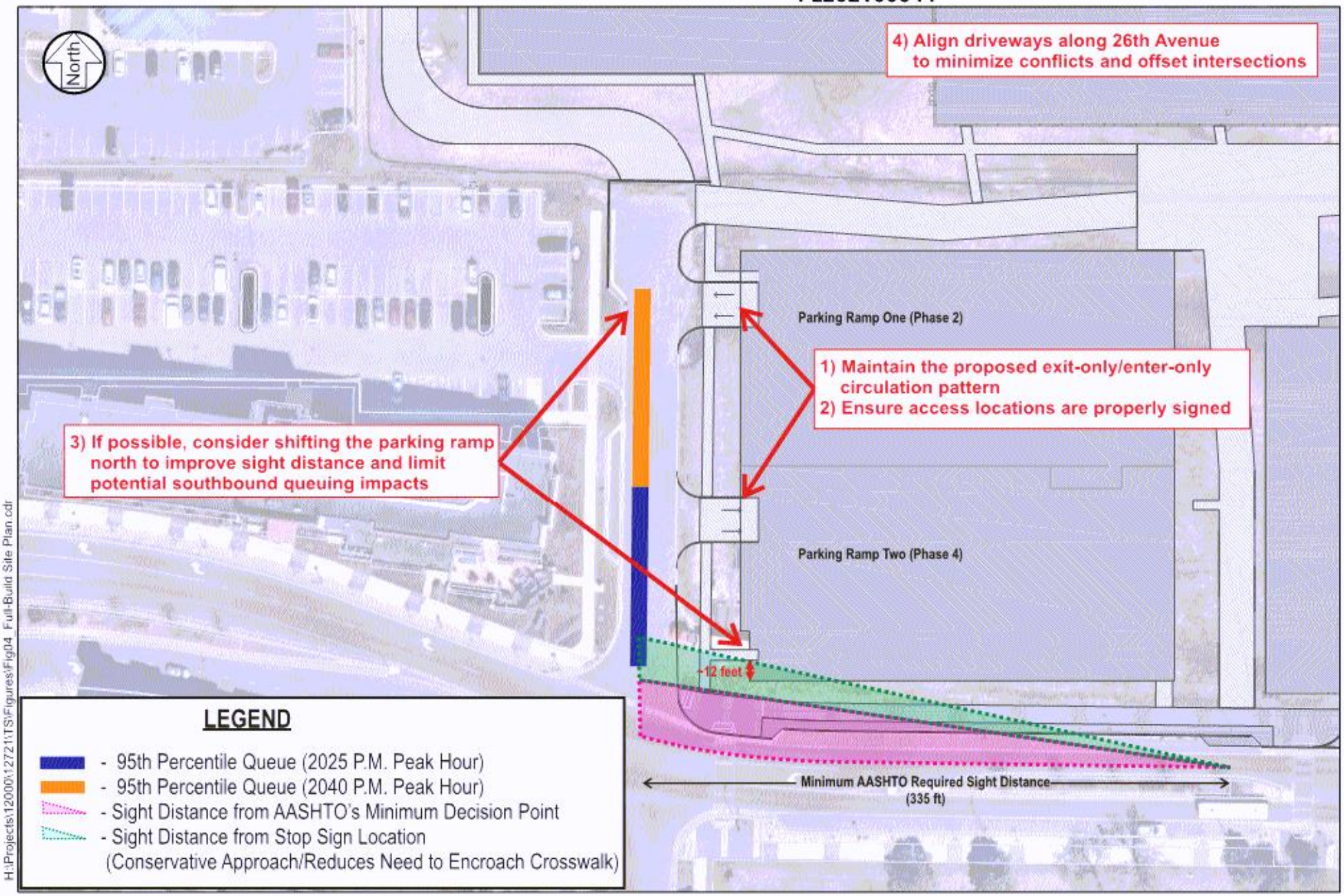
Sight distance was reviewed at the proposed access locations to determine if there are any potential safety issues related to sight distance. Based on the cursory review, two access locations, Lindau Lane/26th Avenue and the 28th Avenue access location, were identified based on their close proximity to the proposed building footprints. Therefore, sight distance triangles were developed at these two locations and compared to the minimum required intersection sight distance based on the AASHTO Green Book and are shown in the Appendix. Based on the speed limit of Lindau Lane (30-mph) and 28th Avenue (35-mph), the minimum required sight distance for vehicles to safely make a left-turn from the side-street is 335 feet and 390 feet, respectively. Note that the initial sight distance triangle analysis was based on the front of a passenger vehicle positioned at the stop sign location, which is considered a conservative approach compared to the AASHTO minimum of 6.5 feet from the traveled roadway. Based on this review, the 28th Avenue access location has adequate sight distance from the stop sign location. Under Phase 4, however, the second parking ramp construction results in insufficient sight distance from the stop sign location for the southbound approach of the Lindau Lane/26th Avenue intersection. Vehicles stopped at the stop sign are only expected to have a sight distance of 175 feet, which is approximately 160 feet short of the minimum required sight distance. In order to obtain the necessary sight distance to make a safe turning maneuver, vehicles will likely need to pull out beyond the stop sign and encroach the crosswalk. While this scenario is not ideal, the sight distance would still meet AASHTO minimum requirements.

Recommendation: If possible, consider shifting the proposed parking ramp north (approximately 12 feet) to improve sight distance and reduce the need for vehicles to encroach on the crosswalk. While existing on-street parking, landscaping/trees can cause some sight distance challenges, especially along Lindau Lane, special consideration should be made to limit any further sight distance impacts from future landscaping, trees, and signing, particularly as part of the proposed development.

Parking Ramp Operations

As mentioned previously, a 550-stall parking ramp is proposed as part of Phase 2 of construction. The parking ramp is proposed to be south of the Phase 1 building/surface parking lot and will include some surface parking south of the ramp. The ramp is proposed to have two access locations; an enter-only access approximately 100 feet from Lindau Lane, and an exit-only access approximately 230 feet from Lindau Lane. As part of Phase 4 of construction, the parking ramp is expected to be expanded to the south, to include a total of approximately 1,140 parking spaces. A review of the proposed parking ramp was completed to identify any issues and recommend potential improvements with regard to access, circulation, and sight distance. Based on this review, the following issues and potential mitigations were identified that should be considered as the project progresses into future phases of development. A summary of the parking ramp improvement considerations are illustrated in Figure 9. Future discussions with the project team should occur to determine the feasibility of the parking ramp considerations.

PL202100044



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SRF Consulting Group, Inc.

Parking Ramp Considerations

SICK, Inc. Development Traffic Study
City of Bloomington

02012721
June 2020

Figure 9

1) Maintain the proposed exit-only/enter-only circulation pattern for the north and south access locations, respectively.
2) Ensure the parking ramp exit-only and enter-only access locations are properly signed.
3) If possible, consider shifting the parking ramp north to improve sight distance and limit potential southbound queuing impacts.
4) Consider aligning driveways along 26th Avenue to minimize conflicts and offset intersections.

Summary and Recommendations

Based on the traffic study for the proposed SICK, Inc. Development in the City of Bloomington discussed above, the following is a summary of the findings and recommendations:

1) All study intersections currently operate at an acceptably overall LOS C or better during the weekday a.m. and p.m. peak hours with the existing traffic control, geometric layout, and signal timing.
2) SICK, Inc., a global manufacturer of sensor solutions for industrial applications, currently has offices in Savage and Bloomington and plans to relocate to the new development. The 493,000-sf development is expected to be constructed in four phases over the next 15 years, depending on market conditions. The initial phase (Phase 1) is expected to be constructed by 2022, with subsequent phases to follow. Although the initial phase is the focus of this study, future phases were also evaluated.
3) The proposed development is expected to generate approximately 387 a.m. peak hour, 391 p.m. peak hour, and 3,181 daily trips once fully constructed.
    a. The trip generation estimates for SICK Development are less than what was determined in the *South Loop Study*, which is due to more refined land use assumptions (i.e. less office space). The SICK Development is expected to generate approximately 206 and 174 fewer peak hours trips during the weekday a.m. and p.m. peak hours, respectively.
4) All study intersections are expected to operate acceptably overall in year 2022, 2025, and 2040 with the SICK development and the improvements identified in Bloomington's CIP.
    a. Southbound queues at the Lindau Lane/26th Avenue intersection are expected to extend to the proposed parking ramp locations in year 2040 p.m. peak hour conditions. These queues are a result of a combination of increased traffic volumes on Lindau Lane and westbound queueing at the Lindau Lane/24th Avenue intersection.
    b. Monitor the intersection and if queuing becomes an issue consider installing "Do Not Block the Intersection" signage for the westbound approach on Lindau Lane and/or converting the westbound right-turn lane to a westbound thru-right lane at the Lindau Lane/24th Avenue intersection.

5) In addition to traffic operations, trucking turning movements and intersection sight distance was reviewed to identify any safety or geometric issues with the proposed site access locations. The following information summarizes the recommendations offered for consideration.

    a. Expand the full-access slightly to provide more space for the designated eastbound right-turn truck maneuvers. Considerations could be made towards reconfiguring the median along American Boulevard to reallocate space and provide more westbound left-turn storage, due to the undevelopable area to the north, however, this is not necessary from a traffic operations perspective.

    b. If possible, consider shifting the proposed parking ramp north (approximately 12 feet) to improve sight distance and reduce the need for vehicles to encroach on the crosswalk. While existing on-street parking and landscaping/trees can cause some sight distance challenges, especially along Lindau Lane, special consideration should be made to limit any further sight distance impacts from future landscaping, trees, and signing, particularly as part of the proposed development.

6) A review of the proposed parking ramp was completed to identify any issues and recommend potential improvements with regard to access, circulation, and sight distance. The following information summarizes the parking ramp improvement considerations. Further discussions with the project team should occur to determine the feasibility of the parking ramp considerations.

    a. Maintain the proposed exit-only/enter-only circulation pattern for the north and south access locations, respectively.

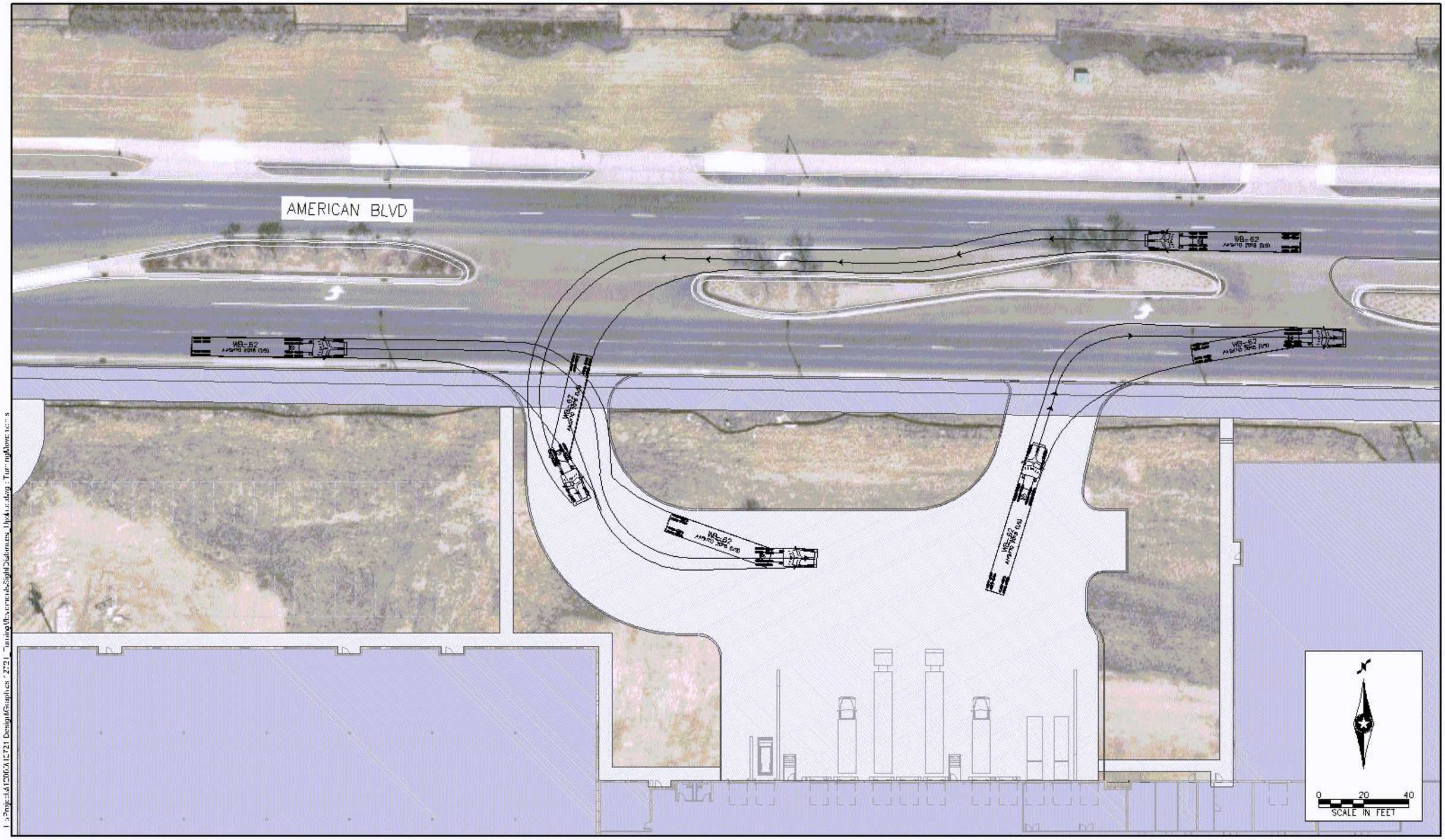
    b. Ensure the parking ramp exit-only and enter-only access locations are properly signed.

    c. If possible, consider shifting the parking ramp north to improve sight distance and limit potential southbound queuing impacts.

    d. Consider aligning driveways along 26th Avenue to minimize conflicts and offset intersections.

Appendices

- WB-62 Truck Turning Movements
- Sight Distance Triangles
- SimTraffic Results



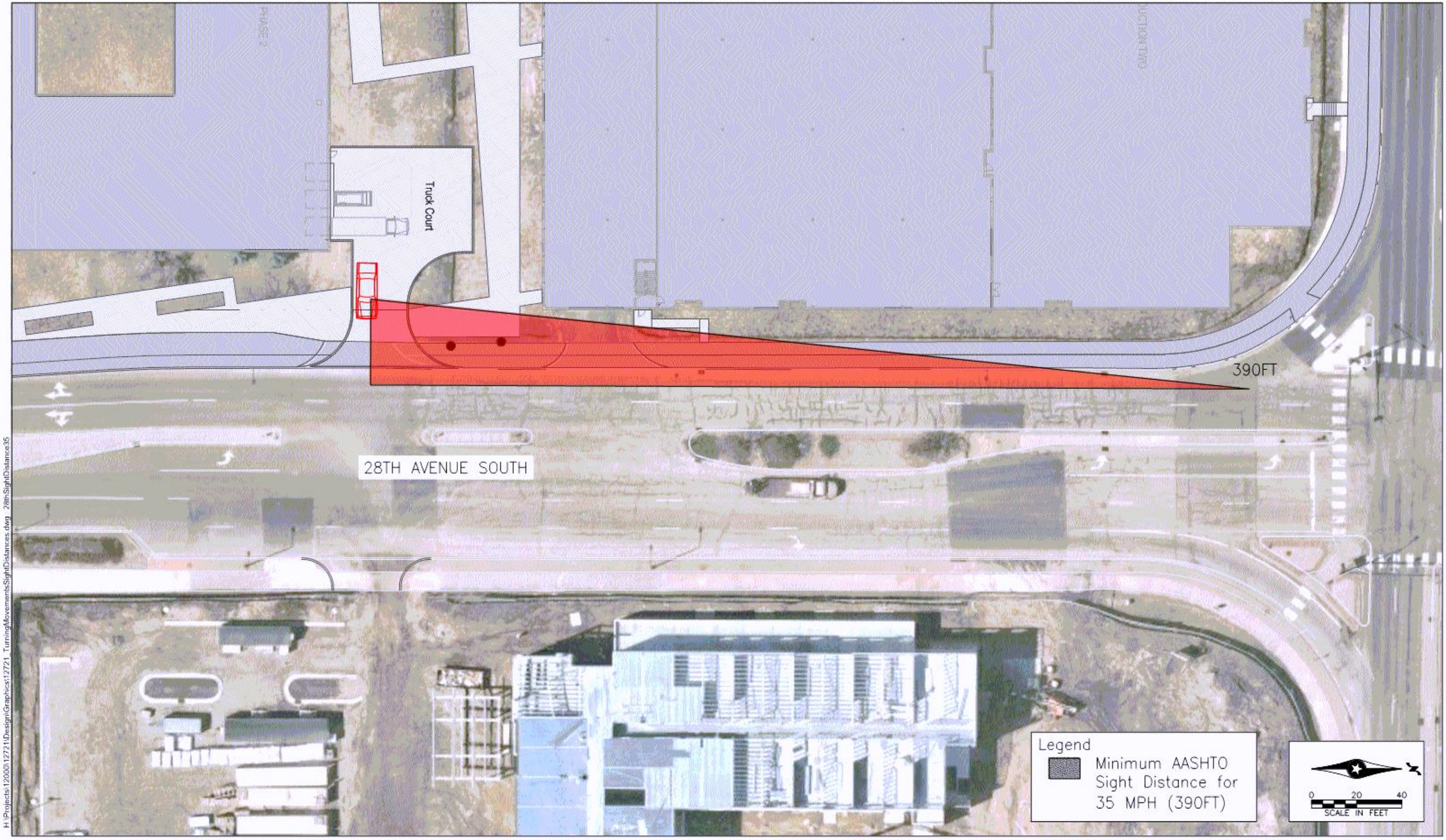
WB-62 Truck Turning Movements - American Boulevard

SICK, Inc. Development Traffic Study
City of Bloomington

Figure A1

Job 1272
16/2022 - 1:00PM

PL202100044



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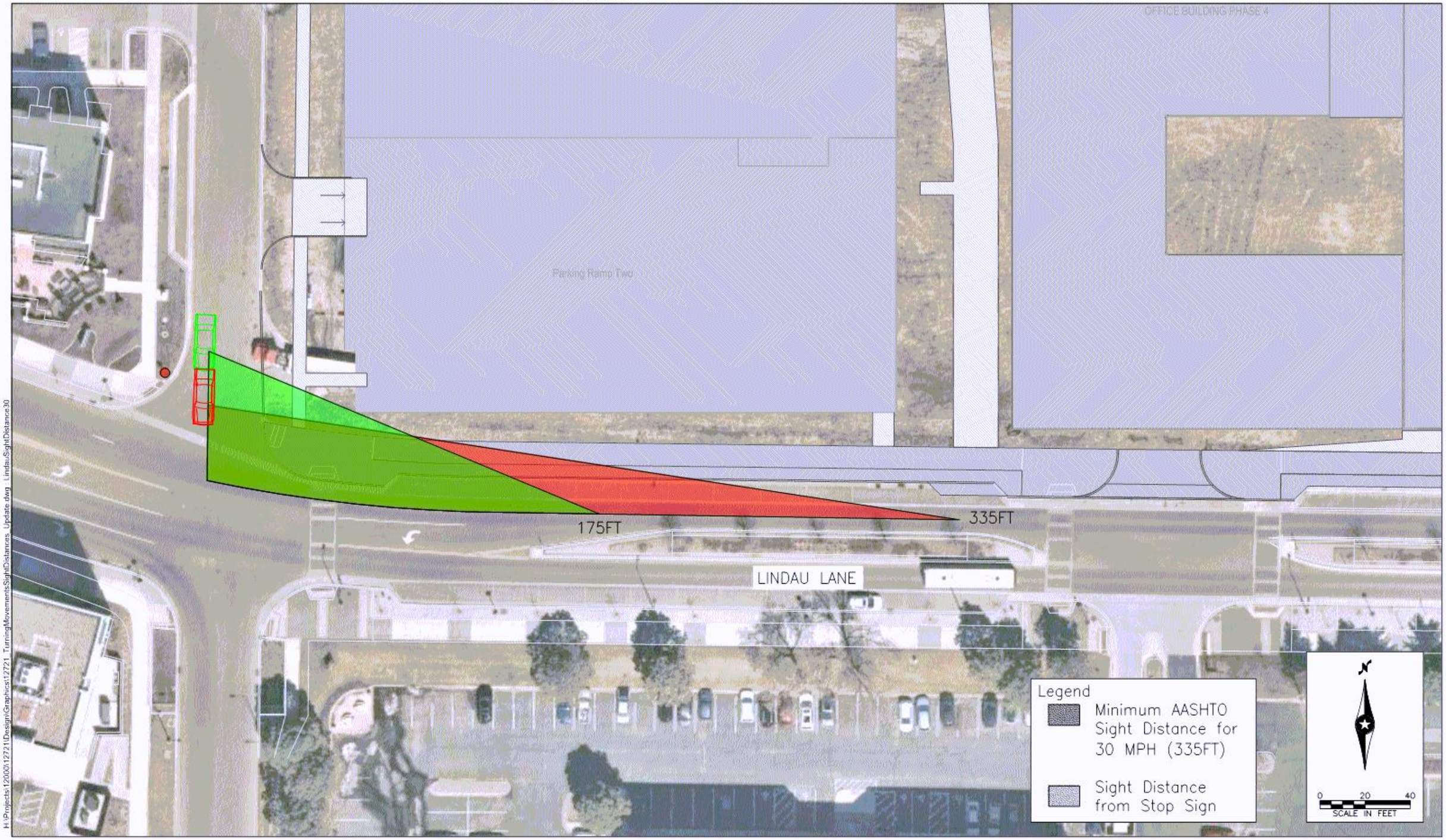
Intersection Sight Distance - 28th Avenue Access

SICK, Inc. Development Traffic Study
City of Bloomington

Job 12721
5/6/2020 - 10:25AM

Figure A2

PL202100044



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Intersection Sight Distance - Lindau Lane/26th Avenue Intersection Access

SICK, Inc. Development Traffic Study
City of Bloomington

Job 12721
6/10/2020 - 1:00PM

Figure A3

PL202100044

Intersection Sight Distance - Lindau Lane/26th Avenue Intersection Access

SICK, Inc. Development Traffic Study
City of Bloomington

Job 12721
5/6/2020 - 10:25AM

Figure A4

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.6	10.5	10.0	9.2	10.8

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.1	0.3	4.7	3.1	2.0

Total Zone Performance

Denied Del/Veh (s)	0.1
Total Del/Veh (s)	766.1

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	T	L	T	L	L	T	T	T	L	T
Maximum Queue (ft)	52	98	119	30	42	25	22	47	32	97	114	43
Average Queue (ft)	18	38	40	10	14	2	2	14	4	30	31	8
95th Queue (ft)	46	75	82	31	39	14	12	42	21	71	77	29
Link Distance (ft)		627	627		393			523	523	523		560
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250			100		200	200				150	
Storage Blk Time (%)											0	
Queuing Penalty (veh)											0	

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	62	132
Average Queue (ft)	12	44
95th Queue (ft)	41	100
Link Distance (ft)	560	560
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	2	4	35	30
Average Queue (ft)	0	0	12	9
95th Queue (ft)	3	3	32	29
Link Distance (ft)			432	664
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	115	60		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	34.8	19.4	25.7	15.3	21.2

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.1	0.0
Total Del/Veh (s)	2.4	0.7	6.6	4.1	2.4

Total Zone Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	2169.9

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	T	L	T	L	L	T	T	T	L	T
Maximum Queue (ft)	83	157	130	99	154	63	72	156	126	214	149	38
Average Queue (ft)	36	76	50	31	61	16	20	66	50	117	66	7
95th Queue (ft)	74	137	101	72	118	48	51	124	106	188	125	26
Link Distance (ft)		627	627		393			523	523	523		560
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250			100		200	200				150	
Storage Blk Time (%)				0	3			0		0	1	
Queuing Penalty (veh)				0	1			0		0	2	

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	63	222	78
Average Queue (ft)	14	76	3
95th Queue (ft)	42	162	67
Link Distance (ft)	560	560	560
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	13	22	58	44
Average Queue (ft)	2	2	26	18
95th Queue (ft)	9	13	44	39
Link Distance (ft)			435	671
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	115	60		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 3

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	16.8	13.8	12.9	11.3	13.3

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.4	0.4	5.6	3.4	2.4

Total Zone Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	1229.1

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	T	L	T	L	L	T	T	T	L	T
Maximum Queue (ft)	66	102	149	38	65	21	26	66	32	102	154	56
Average Queue (ft)	21	39	63	12	24	2	2	19	6	33	51	10
95th Queue (ft)	52	79	117	35	57	12	13	49	26	79	115	35
Link Distance (ft)		627	627		394			523	523	523		560
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250			100		200	200				150	
Storage Blk Time (%)					0						0	
Queuing Penalty (veh)					0						0	

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	62	126
Average Queue (ft)	14	50
95th Queue (ft)	44	105
Link Distance (ft)	560	560
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	23	13	36	27
Average Queue (ft)	2	1	15	13
95th Queue (ft)	12	7	35	34
Link Distance (ft)			435	661
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	115	60		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	34.5	22.8	29.2	17.6	23.7

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.7	0.6	7.2	4.6	2.8

Total Zone Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	1935.5

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	T	L	T	L	L	T	T	T	L	T
Maximum Queue (ft)	128	131	146	107	188	59	72	175	166	246	169	79
Average Queue (ft)	50	72	65	41	96	15	23	78	61	120	83	9
95th Queue (ft)	105	126	122	84	164	45	58	140	127	196	148	39
Link Distance (ft)		627	627		392			523	523	523		560
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250			100		200	200				150	
Storage Blk Time (%)				1	12			0		0	2	0
Queuing Penalty (veh)				1	6			0		0	4	0

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	68	189	77
Average Queue (ft)	18	79	3
95th Queue (ft)	50	149	66
Link Distance (ft)	560	560	560
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	30	19	68	60
Average Queue (ft)	3	2	28	30
95th Queue (ft)	16	10	50	48
Link Distance (ft)			415	662
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	115	60		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 10

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	19.4	16.3	17.1	14.8	16.7

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	3.2	0.4	8.9	3.7	3.2

Total Zone Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	1743.7

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	L	L	T	T	T
Maximum Queue (ft)	72	99	195	72	53	85	66	31	38	73	56	106
Average Queue (ft)	25	40	99	25	13	34	30	3	3	27	10	40
95th Queue (ft)	59	78	172	59	41	69	55	17	18	58	36	80
Link Distance (ft)		645	645	645		388	388			522	522	522
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250				100			200	200			
Storage Blk Time (%)						0						
Queuing Penalty (veh)						0						

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	218	92	178
Average Queue (ft)	99	25	65
95th Queue (ft)	184	69	135
Link Distance (ft)		587	587
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	300		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	57	10	48	55
Average Queue (ft)	9	0	17	21
95th Queue (ft)	33	6	38	44
Link Distance (ft)			407	647
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	115	60		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	35.3	29.1	31.8	19.7	26.7

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	2.8	0.8	9.2	7.7	4.2

Total Zone Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	2167.2

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	L	L	T	T	T
Maximum Queue (ft)	121	141	152	102	199	318	191	61	80	203	148	200
Average Queue (ft)	55	73	70	40	65	154	70	18	31	103	68	100
95th Queue (ft)	105	125	129	81	147	260	143	49	64	169	124	161
Link Distance (ft)		645	645	645		386	386			522	522	522
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250				100			200	200			
Storage Blk Time (%)					1	31				0		0
Queuing Penalty (veh)					3	20				0		0

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	210	77	205
Average Queue (ft)	115	24	93
95th Queue (ft)	193	59	165
Link Distance (ft)		587	587
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	300		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LTR	LTR
Maximum Queue (ft)	30	26	9	80	118
Average Queue (ft)	6	2	0	33	52
95th Queue (ft)	20	14	2	59	93
Link Distance (ft)			332	411	643
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	115	60			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 23

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	25.7	23.0	29.6	23.6	25.2

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	4.1	0.5	15.5	5.5	4.2

Total Zone Performance

Denied Del/Veh (s)	0.1
Total Del/Veh (s)	1794.5

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	L	L	T	T	T
Maximum Queue (ft)	138	180	409	107	78	136	78	68	107	130	126	163
Average Queue (ft)	56	84	194	48	17	59	33	15	49	58	32	77
95th Queue (ft)	113	151	331	89	54	115	58	47	91	111	78	136
Link Distance (ft)		645	645	645		388	388			522	522	522
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250				100			200	200			
Storage Blk Time (%)					0	3						
Queuing Penalty (veh)					0	1						

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	283	327	225	4
Average Queue (ft)	140	140	121	0
95th Queue (ft)	245	260	205	4
Link Distance (ft)		587	587	587
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	300			
Storage Blk Time (%)	0	0		
Queuing Penalty (veh)	0	1		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LTR	LTR
Maximum Queue (ft)	76	8	4	63	63
Average Queue (ft)	20	0	0	20	26
95th Queue (ft)	56	6	4	47	50
Link Distance (ft)			357	425	656
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	115	60			
Storage Blk Time (%)	0				
Queuing Penalty (veh)	0				

Zone Summary

Zone wide Queuing Penalty: 2

340: 24th Avenue S & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	39.1	42.4	48.8	36.0	41.2

500: 26th Ave & Lindau Lane Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.3	0.1
Total Del/Veh (s)	3.2	2.4	23.0	23.7	10.5

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	1920.6

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	L	L	T	T	T
Maximum Queue (ft)	266	287	237	161	200	450	382	176	275	449	294	296
Average Queue (ft)	142	151	114	61	113	327	158	91	154	242	153	180
95th Queue (ft)	228	241	199	115	221	455	301	152	274	384	246	271
Link Distance (ft)		645	645	645		386	386			522	522	522
Upstream Blk Time (%)						5	1			0		
Queuing Penalty (veh)						22	5			0		
Storage Bay Dist (ft)	250				100			200	200			
Storage Blk Time (%)	1	1			9	50		0	0	17		2
Queuing Penalty (veh)	2	2			37	41		0	0	39		1

Intersection: 340: 24th Avenue S & Lindau Lane

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	264	335	457	93
Average Queue (ft)	150	116	191	3
95th Queue (ft)	245	231	357	74
Link Distance (ft)		587	587	587
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	300			
Storage Blk Time (%)	0	0		
Queuing Penalty (veh)	0	0		

Intersection: 500: 26th Ave & Lindau Lane

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	TR	LTR	LTR
Maximum Queue (ft)	58	20	139	148	257
Average Queue (ft)	15	2	20	51	118
95th Queue (ft)	42	12	89	103	215
Link Distance (ft)			332	424	650
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	115	60			
Storage Blk Time (%)			2		
Queuing Penalty (veh)			0		

Zone Summary

Zone wide Queuing Penalty: 150